

## **WIRE PROTECTOR AND RELATED METHODS**

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## **WIRE PROTECTOR AND RELATED METHODS**

### **FIELD OF THE INVENTION**

[0001] The present invention relates generally to the installation of electrical wire  
5 and, more particularly, to devices for protecting electrical wire from damage when the wire is stapled to a surface.

### **BACKGROUND OF THE INVENTION**

[0002] Various types of wire can be secured to a surface as part of installation.  
10 For example, conventional wiring for use with telephone, sound, doorbell and thermostat systems is secured to a surface, such as a wall or floor surface, using a staple. These wires typically have a plastic sheath that protects the interior electrical wire and electrically isolates the wire from the outside environment. The staple fits over the wire and into the surface to secure the wire. However, staples used in this  
15 configuration may puncture the plastic sheath around the wire and damage the electrical contacts inside the sheath. Damage to the sheath may adversely affect the performance of the wire. Electrical connections may be broken and a damaged wire may require replacement. Moreover, damage to the sheath may not cause immediate failure of the wire, but can cause subsequent failures due to wear on a poorly  
20 protected wire over time. It may be difficult to locate connection failures in a system. These and other problems can increase the costs of electrical wire installation and materials.

### **SUMMARY OF THE INVENTION**

25 [0003] In view of the above discussion, a wire protector is provided for protecting a wire during mounting of the wire on a mounting surface. In some embodiments, the wire protector includes a retaining member configured to engage the wire. The retaining member includes a top portion and first and second arms extending  
30 generally perpendicularly from the top portion. Junctures between the top portion and the first and second arms are arcuate to engage the wire therein. At least one securing member is connected with the retaining member and adapted to position the retaining member on the surface. In this configuration, the wire can be engaged between the first and second arms and positioned on the surface. The protector can temporarily

secure the wire on the surface. The protector can also shield the wire from a staple positioned over the wire protector and the wire to secure the wire. In this configuration, damage to the wire during installation on a surface may be reduced and electrical contacts can be preserved.

5 [0004] In some embodiments, the securing member includes at least one pointed tip extending from a lower edge thereof and configured to grip the surface. The securing member may include a plurality of pointed tips extending from the lower edge thereof.

[0005] In some embodiments, the retaining member includes a generally flat  
10 surface configured to extend a distance along the length of the wire when mounted on the mounting surface. The distance can be between about 0.2 and about 0.5 inches. The protectors according to embodiments of the invention can be formed of a polymeric material and/or formed as a unitary member.

[0006] In some embodiments, a mounted wire assembly is provided. The wire  
15 mounted assembly includes a wire resting against a surface, a protector overlying the wire, and a staple overlying the protector such that the staple secures the wire and the protector to the surface. The protector includes a retaining member configured to engage the wire. The retaining member includes a top portion and first and second arms extending generally perpendicularly from the top portion. The protector further  
20 includes at least one securing member connected with the retaining member and adapted to position the retaining member on a surface.

[0007] In further embodiments, methods for protecting a wire during mounting of the wire on a mounting surface are provided. A protector is positioned over a wire. The protector includes a retaining member configured to engage the wire. The  
25 retaining member includes a top portion and first and second arms extending generally perpendicularly from the top portion. The protector further includes at least one securing member connected with the retaining member and adapted to position the retaining member on a surface. The protector is secured to the underlying surface with the securing member. A staple is applied to the surface over the protector. The  
30 staple secures the wire and the protector to the surface.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0008] **Figure 1** is a cross sectional view of a wire assembly including a wire, a wire protector, and a staple according to embodiments of the present invention.

[0009] **Figure 2** is a perspective view of the wire and wire protector of **Figure 1**.

[0010] **Figure 3** illustrates the wire protector of **Figure 1** installed on a wire.

[0011] **Figure 4** is a side view of the wire assembly of **Figure 1**.

[0012] **Figures 5, 6 and 7** are cross sectional views of the wire assembly of  
5 **Figure 1** illustrating the wire protector installed on the wire (**Figure 5**), the wire  
protector securing the wire to a surface prior to installation of the staple (**Figure 6**),  
and the staple installed over the wire protector and the wire (**Figure 7**).

[0013] **Figure 8** is a perspective view of a wire protector according to further  
embodiments of the present invention.

10 [0014] **Figure 9** is a cross sectional view of the wire protector of **Figure 8**.

[0015] **Figure 10** is a flow chart illustrating operations according to embodiments  
of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

15 [0016] The present invention now will be described more fully hereinafter with  
reference to the accompanying drawings, in which preferred embodiments of the  
invention are shown. This invention may, however, be embodied in many different  
forms and should not be construed as limited to the embodiments set forth herein;  
rather, these embodiments are provided so that this disclosure will be thorough and  
20 complete, and will fully convey the scope of the invention to those skilled in the art.  
In the drawings, like numbers refer to like elements throughout. Thicknesses and  
dimensions of some components may be exaggerated for clarity.

[0017] The present invention relates to wire protector devices that can be used to  
protect a wire during mounting of the wire on a surface. Wire protectors according to  
25 certain embodiments of the invention may be manufactured economically from a  
single piece of material using various inexpensive materials and known  
manufacturing techniques including injection molding.

[0018] For ease of discussion, the embodiments described herein are shown with  
reference to a flat wire, such as a telephone or communication wire. However, wire  
30 protectors according to embodiments of the invention may be used in connection with  
any wire or cable, including wire or cable for sound systems, doorbell ringers,  
thermostat wires, coaxial cables, and the like.

[0019] A wire assembly 10 according to embodiments of the present invention is  
illustrated in **Figure 1**. The wire assembly 10 includes a wire 22, a wire protector 26,

and a staple 14, and is placed on a surface 16. The wire 22 includes a sheath 20 that encases one or more electrical conductors 18. The sheath 20 can be made of plastic or any suitable material for protecting the conductors 18, and can include material between the conductors 18 to electrically isolate the conductors 18 from one another.

5 The wire protector 26 is configured to overlies the wire 22 so as to reduce the risk of puncturing the sheath 20 when the staple 14 secures the wire protector 26 and the wire 22 to the surface 16.

[0020] As illustrated in **Figure 1**, the wire protector 26 includes a retaining member 12 for retaining the wire 22 and a securing member, such as teeth 24, adapted to position the retaining member 12 on the surface 16. In particular, the retaining member 12 includes a top portion 12a and two arms 12c that extend in a generally perpendicular direction from the top portion 12a. The junctures 12b between the top portion 12a and the two arms 12c are arcuate to engage the wire therein. The teeth 24 can include a pointed tip extending from the lower edge of the wire protector 26 to grip the surface 16 when the wire protector 26 is placed on the surface 16 and over the wire 22.

[0021] In this configuration, the wire protector 26 can protect the wire 22 from damage and reduce the likelihood that the staple 14 may puncture the wire 22. For example, the wire protector 26 can protect the sheath 20 from being punctured by the staple 14 during installation. The wire protector 26 can also secure the wire 22 in position on the surface 16 temporarily prior to installation of the staple 14 over the wire protector 26 and the wire 22.

[0022] As shown in **Figures 2 and 3**, the wire protector 26 is configured to fit over the wire 22. In particular, the wire 22 can be placed adjacent the top portion 12a of the retaining member 12 so that the retaining member 12 holds the wire 22 therein. More specifically, the arcuate shape of the junctures 12b between the top portion 12a and the arms 12c is configured to hold the wire 22 therein. As shown in **Figure 3**, the retaining member 12 can grip the wire 22 snugly so that a substantial portion of the retaining member 12 is in contact with the surface of the wire 22. Alternatively, the retaining member 12 can grip the wire 22 on the sides of the wire 22, *e.g.*, at junctures 12b, and the top portion 12a of the retaining member 12 may not be in contact with the wire 22. In some embodiments, the wire protector 26 is formed from a material that is flexible enough to deflect to engage the wire 12 and resilient enough to recover so that the retaining member 12 snaps over the wire 22 to securely hold the wire 22 in

between the junctures **12b** and the arms **12c** of the retaining member **12**. The wire protector **26** can be formed of a polymeric material and/or as a single unitary member.

[0023] Referring to **Figure 3**, the wire **22** has a width  $w_w$  of between about 0.25 to about 0.75 inches. In some embodiments, the wire **22** has a width  $w_w$  of about 0.5 inches. The wire protector **26** has a distance  $d_j$  between the junctures that is large enough to accommodate the wire width  $w_w$ , such as between about 0.25 to about 1.0 inches. For example, if the wire width  $w_w$  is 0.5 inches, then the juncture distance  $d_j$  can be between about 0.5 inches and about 0.7 inches.

[0024] As illustrated in **Figure 3**, the retaining member **12** of the wire protector **26** has a generally flat surface that extends a distance  $d_p$  along the length of the wire. The distance  $d_p$  should be sufficient to protect the wire **22** during installation of a staple. The distance  $d_p$  can vary based on the width of the staple that is installed over the wire protector **26** so that the distance  $d_p$  is at least as long or longer than the width of the staple. In some embodiments, the distance  $d_p$  is between about 0.2 and about 0.75 inches, or about 0.5 inches. The thickness of the retaining member can be between about 0.125 inches and about 0.25 inches or more.

[0025] As shown in **Figure 4**, the wire protector **26** can include teeth **24** for gripping the surface **16**. The teeth **24** can penetrate the surface **16** so that the wire protector **26** is secured to the surface **16**. In this configuration, the wire protector **26** can secure the wire **22** to the surface **16** temporarily prior to the installation of the staple **14**. As shown in **Figure 4**, the top portion **12a** of the retaining member **12** is curved so as to guide the staple **14** to a perpendicular installed position with respect to the surface **16**. For example, the staple **14** can be installed using a hammer. If the force of the hammer pushes the staple **14** at an angle with respect to the perpendicular installed position, the curved shape of the top portion **12a** can guide the staple **14** as it enters the surface **16** to a more perpendicular position.

[0026] **Figures 5-7 and 10** illustrate methods and configurations for protecting a wire during mounting of the wire on a mounting surface. Referring to **Figure 10**, a wire protector can be positioned over a wire (**Block 200**). For example, the wire protector can be the wire protector **26** shown in **Figure 5** with the retaining member **12** configured to engage the wire **22**. However, other wire protectors and alternative configurations can be used. As illustrated in **Figure 5**, the retaining member engages the wire between the arcuate junctures **12b** so that the junctures **12b** and an undercut portion **12b'** thereof grip the wire **22**. With reference to **Figure 10**, the wire protector

can be secured on a surface (**Block 202**), such as the surface **16** as shown in **Figure 6** using teeth **24** or another securing member. A staple is then applied to the surface over the protector so that the staple secures the wire and the protector to the surface (**Block 204**). The staple can be the staple **14** shown in **Figure 7** securing the wire **22** and the protector **26** to the surface **16**.

[0027] Although the method steps illustrated in **Figure 10** are discussed above with respect to the wire protector **26** and the illustrated steps shown in **Figures 5-7**, the steps of **Figure 10** can be used with other configurations of wire protectors, wires, staples and the like. For example, the steps illustrated in **Figure 10** can be employed using an alternative wire protector **110** as shown in **Figures 8-9**. The wire protector **110** includes a retaining member **104** configured to engage a wire and a securing member (not shown), such as a tack **102**, for positioning the retaining member **104** on a surface.

[0028] The retaining member **104** includes a top portion **104a** and two arms **104c** extending generally perpendicularly from the top portion **104a** and junctures **104b**. As illustrated, the junctures **104b** are arcuate in shape to engage the wire therein. However, other shapes can be used. For example, the junctures **104b** can be modified to form a corner forming a ninety degree angle between the top portion **104a** and the arms **104c**. In some embodiments, the top portion **104a** has a bottom surface **104a'** that has an adhesive thereon. An adhesive on the bottom surface **104a'** can be used to secure a wire in the retaining member **104** and may be used instead of or in addition to the arcuate junctures **104b** for securing a wire therein.

[0029] The tack **102** includes a point **106** for securing the wire protector **100** to a surface. The tack **102** can be formed of the same material or a different material from the retaining member **104**. In some embodiments, the tack **102** is formed of a metal material, such as aluminum or steel, and the retaining member **104** is formed of a polymeric material. In other embodiments, the tack **102** and the retaining member **104** are both formed of a polymeric material or both formed of a metal.

[0030] The wire protectors according to embodiments of the present invention can be manufactured from various materials using various processes understood by those of skill in the art. Exemplary materials include, but are not limited to, polymeric materials such as polyethylene and polypropylene, and exemplary manufacturing methods include, but are not limited to, injection molding.

[0031] The foregoing is illustrative of the present invention and is not to be construed as limiting thereof. Although a few exemplary embodiments of this invention have been described, those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention as defined in the claims. Therefore, it is to be understood that the foregoing is illustrative of the present invention and is not to be construed as limited to the specific embodiments disclosed, and that modifications to the disclosed embodiments, as well as other embodiments, are intended to be included within the scope of the appended claims. The invention is defined by the following claims, with equivalents of the claims to be included therein.